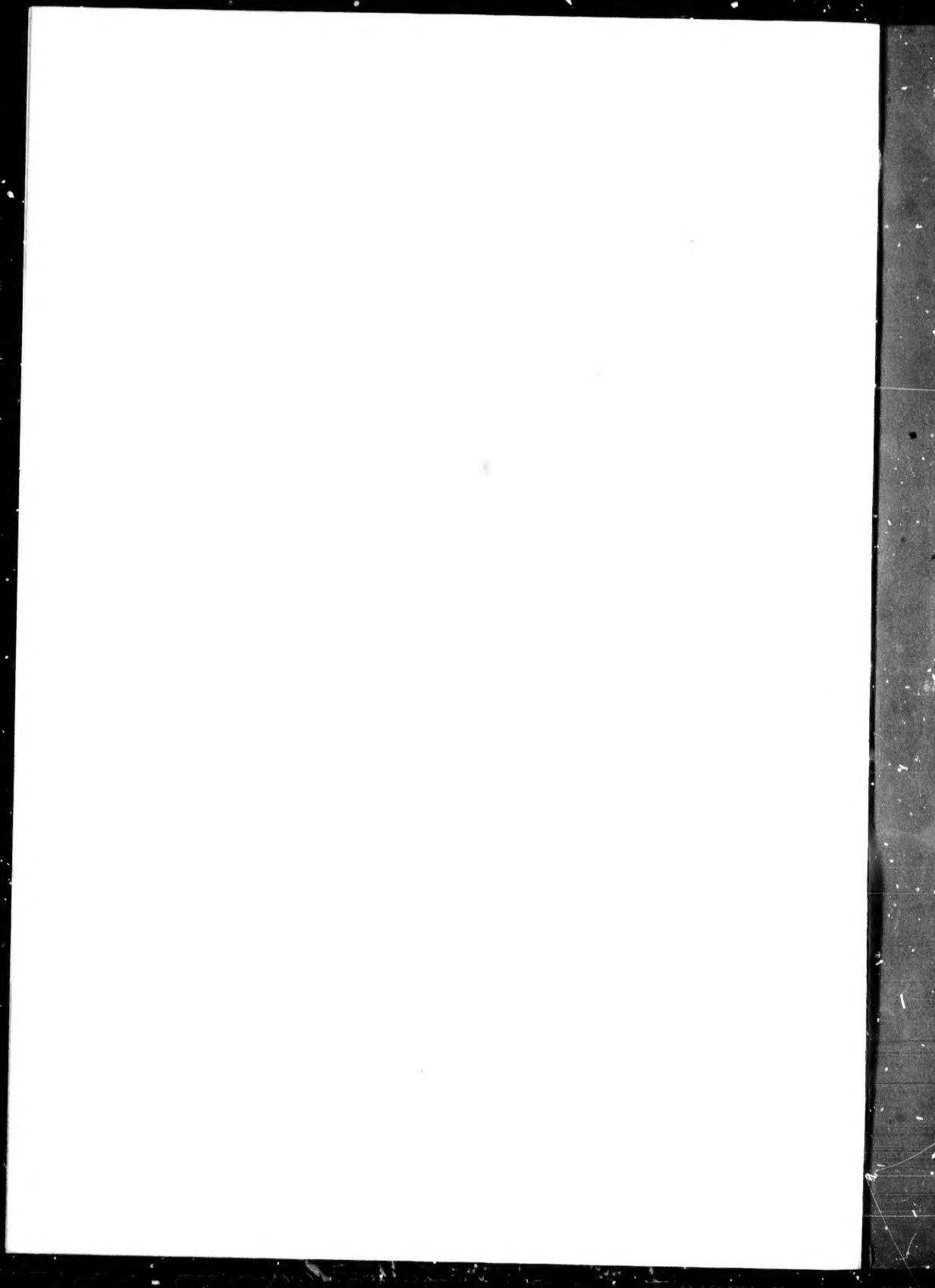




Dr W. Marsden

*with compliments
of F. X. B.*

REPORT AND PLANS
ON
GENERAL IMPROVEMENTS
IN THE
QUEBEC HARBOUR.

SUBMITTED TO THE
HARBOUR COMMISSIONERS.

BY
F. X. BERLINGUET.

Montreal:
PRINTED BY THE LOVELL PRINTING AND PUBLISHING COMPANY.
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QUEBEC, 15th December, 1874.

TO THE QUEBEC HARBOUR COMMISSIONERS,

GENTLEMEN,

I have the honour to submit to you herewith, plans, specifications and estimates for the extension and improvement of the Harbour of Quebec, "having due regard to the future as well as to the present trade of the Port."

By the execution of my plans, space and facilities are obtained for every important branch of trade and commerce. On each side of the spacious docks, room and building lots on an extensive scale are provided for the erection of large stores, warehouses or manufactories for the various industries which will undoubtedly seek the advantages of deep water and railway communication at their doors.

The greatest care has been taken to avoid injury to private property or interference with any particular trade or industry now existing, on the contrary the plans now submitted are in the interest of the wharf proprietors and business community of St. Paul street, whilst giving a direct route, and at a moderate cost, for the continuation of the North Shore Railroad to deep water, and this without disturbing the present contract with that extension in view, or with the station at the Palais, as may be seen by the official plans.

As you have fixed the amount of expenditure to commence with at \$500,000, I have divided the works to be constructed into sections, which, without disturbing the uniformity of the whole, will permit a part only to be first carried out. I attach a special plan, which for that amount would be an important and most useful beginning of the great and complete scheme I contemplate as a whole.

Before deciding on my plans I have carefully studied the Harbour of Quebec and its environs, and for reference I annex a general plan with the soundings, those in the St. Lawrence from Admiral Bayfield's chart, those in the St. Charles specially made by myself.

The Harbour of Quebec presents five divisions:—

- 1st. The South Shore from St. Romuald's to Indian Cove.
- 2nd. The Island of Orleans.
- 3rd. The North Shore from the extremity of the Coves to the Commissioners' wharves.

4th. The Canardière and Beauport Shores.

5th. The Embouchure of the St. Charles River.

The South Shore in its most important localities is wanting completely in width for any large extension, and those parts where space is available to a limited extent are now profitably occupied as timber coves, saw mills and ship building yards, any interference with which would serve neither the interests of Quebec, nor Levis.

The Island of Orleans, though possessing certain advantages in its shores, cannot, from its isolated position, meet the conditions and requirements of commerce. Its adaptation as a place of summer and pleasure resort will more and more be recognized, and as such, no doubt, it is destined to be made use of by our wealthy citizens in a constantly increasing extent.

The North Shore from Cap Rouge to the Commissioners' wharves has received my most special attention, not only in its geographical position, but as being the centre of the existing commerce of Quebec. The whole length from Cap Rouge to the Champlain market is so limited in width between the river and the cliffs, that Champlain street and its prolongation has scarcely width enough for two vehicles to pass each other, whilst the depth of water at low tide is such as to prohibit any extension in that direction to the extent needed to build up a new centre of commerce. It is in this quarter that the great timber trade of the Port finds accommodation, whilst it is also specially adapted for the construction of ships and making repairs to them in floating docks.

Before arriving at Champlain market we come to the wharves occupied by the Allan steamers, which, although the largest, and occupying the best position in the Port, are so insufficient that this Company are the first to ask for Harbour improvements and increase accommodation.

In the Lower Town the space is more extended no doubt,—but what part of it is not already occupied and utilised?—whilst passengers arriving at or leaving the port are not obviously inconvenienced from want of space, the street being encumbered with traffic, and the wharves loaded with huge piles of coal. It is here the commerce of Quebec centres, where all the banks, merchant offices, stores &c., are located, any displacement of which is simply impracticable from the magnitude of existing interests. As a proof of this, look how long the opening of Dalhousie street has been delayed; the Lower Town is our only centre of commerce, and what is it but a labyrinth of lanes most difficult for vehicles to find free passage through. We of the present generation see it to-day just what it has been for the last half century, and such will it continue to be until space and room for extension be provided. At present, improvement giving room for freer circulation cannot be carried out, but with the growth of a new and im-

proved district adjoining, to which trade and commerce must resort, it will be possible to replace the older and crowded parts of the present Lower Town with spacious streets and warehouses more worthy of the commercial position Quebec occupies.

Speaking now of the Battures of the Canardière and Beauport shores, they are destined, I conceive, to take the position to the Quebec of the future that Brooklyn occupies to New York. The growth of large manufacturing industries may safely be predicated. The enormous water-powers of the Rivers Montmorency and Beauport can be made available over a considerable distance; but leaving this to be hopefully looked forward to for the future, I come to what is practicable and feasible for present action.

It remains now only to examine the River St. Charles, and to show that it is in the bed and estuary of that river that we must look for the immediate and first extension of improvement for the Harbour and trade of Quebec.

This area offers so many great and clearly apparent advantages for the objects in view, both as to wharf and dock accommodation and the extension of the centre of business and trade of Quebec, that for years past some general scheme has been foreshadowed in connection with docks in the River St. Charles. The bed of the river, formed of sand and alluvions, presents no difficulties to carrying out works of improvement which must of necessity be executed there, even if the Commissioners do not adopt the plans I now submit. It is a recognized fact to-day that loaded schooners can only enter or leave the St. Charles at mean high tides, during about one hour of each tide. The beds of the river having filled up greatly since the construction of the Break-water wharf, the current abruptly stopped by this structure deposit the sand and other matters it is charged with. We have proof of this assertion in the fact that along the west side of the Break-water, where, at the time of its construction there were 40 feet of water at low tide, the line of navigation to the Harbour of Quebec 530 feet inside the Break-water, at which distance the sounding on Admiral Bayfield's chart gives 18 feet at low water, while to-day the bed of the river is dry 200 feet from the wharf, and before long ships will be unable to enter inside the Break-water. These facts are perfectly well known, and I state them to prove that dredging must be resorted to, and the materials to be dredged out can be used to assist in building the permanent structures I propose, instead of taking it out of one part of the river to put it into another. This consideration should find its place here in a system of judicious improvements to the general end, whilst the ballast brought here by ships might also be used for the same purpose.

My calculations of the probable cost of the works I propose embrace their construction in a perfect and solid manner, taking due account that the amount

to be first expended be employed in a manner the most useful as a commencement of works, which may, as circumstances permit, be added to hereafter, and finally completed, and I claim that by the adoption of my plans the following important results and advantages to Quebec will be brought about:—

1st. The enlargement of the area for carrying on the trade of Quebec, so long restricted to its present limits.

2nd. Facilities for loading and discharging vessels from beyond the seas, or from the interior.

3rd. Offering the advantages of space required for the creation of various large industries requiring the close proximity of deep water and railroad communication, and facilitating the growth of new branches of trade in Quebec, particularly the enormous grain and produce trade of the West. Large commercial houses from all parts of the Dominion, Great Britain, the United States or other foreign countries would find room and unequalled accommodation for establishing branches or agencies.

4th. Making the extension of the North Shore Railroad to deep water serve in the Harbour and general improvements, instead of its probable interference otherwise with the business of St. Paul street, by passing over, and obstructing the wharves in that locality.

5th. Providing accommodation for schooners and other local craft, now very much needed by them.

DESCRIPTION AND SPECIFICATIONS OF PLANS NO. 1 and 2.

My plans consist of the construction of four large Docks, of which two will be closed, and two open for the reception of vessels waiting entrance to the inner Docks.

DOCK No. 1.

The closed Dock No. 1 is formed by the prolongation of Dalhousie street to meet an embankment protected and supported by timber wharf frontages, starting from the wharf of the Gas Works Company, just at the outlet of the North Shore Railway from its terminus, and continued unto deep water, to be terminated there by a wing, forming a line with the present Break-water. The Basin outside the closed Dock, being formed by the prolongation of Dalhousie street and the embankment above mentioned, the Break-water, and the Commissioners wharf, with entrances and outlets at each end of the Break-water.

DOCK No. 2.

The closed Dock No. 2 is formed by another embankment, constructed as the preceding one, starting from Munn's old yard in a straight line with Prince

Edward street, precisely at the place where the North Shore Railroad reaches the Palais wharves, and to be continued parallel to the other embankment as far as deep water, there to be terminated also by a wing in a line exactly similar to the first one, the Dock to be closed between the two longitudinal embankments by a transverse one with lock and double gates, the space outside the gates and the termination at deep water forming the Waiting Basin. The second wing will form a Break-water to protect schooners or other vessels using the outside wharf frontage of the second embankment.

LONGITUDINAL EMBANKMENTS, STREETS AND BUILDING LOTS.

The embankment which forms Dock No. 1 will have a length of 4300 feet, the second embankment will be 7047 feet long. The breadth of each, including the protecting wharves, will be 250 feet. Both are divided in the entire length by three streets, each of 50 feet wide, two fronting the water, and the middle one passing in the centre of the embankment.

The embankment of No. 1 Dock is divided into 137 building lots of 50 square feet each. The embankment No. 2 gives 177 lots of the same dimensions; these lots are separated into blocks of eight, which if all built on would give 400 feet of connected buildings, separated from its adjoining blocks by a transverse street of 100 feet wide. These transverse streets number 24 in all, affording ample space for free circulation of traffic, and serving in case of fire to prevent its extending from one block to another.

TRANSVERSE EMBANKMENTS.

The transverse embankment which closes Dock No. 1 will be 960 feet long and 150 feet wide, giving space for two new streets and 15 building lots. The embankment closing Dock No. 2 is 750 feet long and 150 feet wide, giving 11 building lots. At the entrance of the Docks on each side there will be a transverse street of 50 feet wide.

AREA OF DOCKS.

Dock No. 1 will have an area of $35\frac{1}{2}$ acres, and the outer or Waiting Basin 21 acres. The area of Dock No. 2 will be $74\frac{3}{4}$ acres, and the outer or Waiting Basin 20 acres. The total area therefore of the closed Docks is $110\frac{1}{2}$ acres, of which $20\frac{1}{2}$ acres will have a depth of water of from 23 to 28 feet. The total area of the outer or Tidal Basins will be 41 acres.

ST. PETER STREET.

By plan No. 2 St. Peter street is prolonged through the first dock to the first longitudinal embankment by a mole 50 feet wide, with opening and Bridge over: this is to facilitate communication between the old centre of commerce and the new Docks.

NORTH SHORE RAILROAD.

Each of the six streets on the embankments can be laid with rails in connection with the North Shore Railroad, and, as indicated by punctured lines on plan No. 2, the track can also be carried on to the Commissioners wharf and along Dalhousie street as far as Champlain Market.

WHARVES.

The level of the protecting wharves on the water fronts of the embankments to be the same as the present Commissioners wharf. The height necessary to construct them will not in any place be less than 32 feet, where the water deepens they will be proportionably higher. These wharves to have a width of 30 feet at the bottom and 15 feet at the top. Their facing to be in solid square timber, protected on the inside of the basins by 4 inch plank, driven by a pile driver to the requisite depth, so as to leave them 4 feet above the bottom of the wharves.

DEPTH OF WATER IN THE DOCKS.

There will never be less than 23 feet of water at the lowest tides, with 9 feet from the water to top of the wharves, while at mean spring tides there will be 28 feet of water, with 4 feet of water to the top of the wharves. This is shown by the longitudinal and transverse sections of plan No. 2, the blue lines for high water at neap tides being marked M. H., and for high water at mean spring tides M. H. G. M. The special observations I have made of the rise and fall of the tides in the St. Charles correspond exactly with what is shown in the Quebec Harbour Chart, the third blue line on the sections marked M. L. indicate low water in the now Tidal basins, which in the shallowest places will not be less than 10 feet where it is now perfectly dry at low water.

FLOOD GATES (Vannes).

To regulate the depth of water in the Docks with the varying height of the tides, Flood Gates are to be constructed, by which means the water inside and outside of the Docks will be kept at the same level, while the entrance gates are open for about three hours in each tide,—a matter of great importance where there are a large number of vessels waiting to enter.

DOCKS OF ENTRANCE, GATES AND BRIDGES.

The lateral walls of the locks to be constructed in first-class masonry, with recesses to receive the gates so as to protect them during the passage of vessels in or out. These walls, as well as the masonry of the sills, will require artificial foundations suited to the nature of the ground, the sills to be at the same level as the bottom of the Docks, the gates will be the same height as the wharves.

The Lock Gates can either be of the ordinary construction, or according to the system of floating caisson adopted to the Garvel Graving Dock, Greenock. In my opinion the ordinary construction is best suited to our climate, the other being liable to greater difficulty in working from ice early in the spring or again late in the fall.

The width of the locks being 50 feet, the bridges which cross them might be made strong enough to allow the passage of railway trains if the Commissioners desire a railway to be brought to the present Commissioners' wharf and to Dalhousie street. The bridges can either be turning bridges or running on rails, the walls of the locks would serve for abutments.

EXCAVATIONS.

The excavations necessary to give a height of 32 feet to the wharves to be used to form the first strata of the embankments, these to be completed by the excavations from the bed of the river required to give the depth of water indicated in the Docks—the total quantity to be taken out for the latter purpose will be all required to bring the embankments to their full height, and my calculations are made so that none will go to waste.

No. 1 Dock bordered as it will be on one side by the present wharves in the rear of St. Paul street, will not require to have its whole area excavated. I propose only to excavate those parts required to make the new constructions available for large ships, as indicated in plan No. 2, by a deeper blue colour which will have a depth of water of 23 to 28 feet, leaving the side next the present wharves as it is now, there being ample water at high tides for the schooners and other craft by which the wharves are now used—and these will moreover have the advantage of being in a closed dock with water always at the same level.

GRAVING DOCK.

Although no special plans for this Dock are asked for in your advertisement inviting competition for plans and ideas for the general improvement of the Harbour of Quebec, yet in view of the great public interest taken in this matter, with the diversity of opinions as to the best choice for its site, and believing, as I do, that the consideration of embracing it, as part, of the general improvements, is of the *utmost importance* instead of its being in a detached and isolated position, I have given great attention to the matter, and in making my plans now submitted have designated thereon four different sites where such a Dry Dock as is required can be constructed.

Two of the sites will be found at the commencement of the embankment forming Dock No. 2, one of which if constructed would be formed on one of

its sides by the above embankment, whilst the embankment to be built by the North Shore Railway would form the other side,—Munn's wharf closing it at one end, leaving only the entrance to be constructed. The other site would be in a similar position but on the other side of the embankment, and without the advantage of having the North Shore Railroad to assist in its formation.

No. 3 site will be found at the deep water termination of embankment No. 2.

No. 4 site is at the end of embankment No. 1. This latter position, as it would be easy of access, being in deep water, as the other No. 3, and in a situation where any obstruction from ice would be at its minimum, whilst it is clear of the strong current of floating ice (the chariot) which passes up and down the river with the tide, thus offering advantages for vessels leaving the Dock at a late period in the Fall, or again very early in the spring, if other circumstances make it desirable to do so. But to adopt this site now would involve the carrying out simultaneously with it at the beginning of the ensemble of my entire plans for the general improvement of the Harbour, and the money to be expended on it would aid in completing the first part of my plans.

The bed of the River St. Charles at either of the two above sites is formed of sand and gravel, and as regards foundations, notwithstanding what is said to the contrary, I do not hesitate to affirm that no extraordinary difficulties will be found on this important point. If the great advantages of placing the Dock here be fully taken into account, the question of a little extra cost involved in foundations is of small comparative importance, and I beg to call special attention to the following considerations.

1st. The sites belonging to the Commissioners, all costs of buying property elsewhere or damages from interference with other interests are avoided.

2nd. The cost of construction would serve materially the general improvements, and, by placing the Dock in either of the embankments proposed, the Coffor Dams for building the Dock would on three sides be formed by the embankments.

3rd. Large space and room for the erection of work shops or other buildings in connection with the Graving Dock, all the property of the Commissioners.

4th. That it would be near the centre of business, and also an easy distance from the residences of the skilled mechanics and laborers of the city.

5th. That it would have the advantage of direct railroad facilities as soon as the North Shore Railroad is completed.

6th. That will permit to utilize it as Wet Dock when it will not be useful as Graving Dock.

7th. As it is at deep water the embankment will be useful as wharves of access for vessels.

DESCRIPTION AND SPECIFICATIONS OF PLAN NO. 3.

This plan is prepared specially in view of the sum stated by the Harbour Commissioners as a commencement of expenditure, viz., \$500,000, and all the works contemplated by it are parts of the more general and comprehensive scheme I submit as a whole. The parts to be first executed I have indicated by different colours, utilizing.

1st. What the North Shore Railway Company might advantageously construct for themselves as their best route to deep water.

2nd. The expenditure which must be made to construct the Graving Dock decided on.

3rd. Taking into account the value of the building lots the Commissioners would have for disposal, which will be found to represent a very considerable amount.

The first part undertaken should be the prolongation of Dalhousie street, including all works connected with the Dock entrances and gates, until it meets the longitudinal embankment, starting from the wharf of the Gas Works Company. I have increased the width of the longitudinal embankment up to this point by 200 feet, the material for which will all be provided by the excavations to deepen the Waiting Dock, and this will give 31 more building lots to dispose of, the value of which is a material consideration in estimating the cost of the increased width.

The wharf frontage in the interior of the Waiting Dock will be 900 feet long, the width of the embankment 450 feet, which gives 52 building lots.

The deep red lines which start from the prolongation of Dalhousie Street to meet the wharf of the Gas Works Company shows the first strata of the embankment, provided by the excavations for the foundations of the protecting wharves.

The parallel green lines shows the wharf to be constructed by the North Shore Railway Company with the amount to be expended to reach deep water, the excavations necessary to build up the embankment to be made by the Harbour Commissioners, the dredging for that purpose will give a channel of 90 feet wide, with 10 feet of water at low tide, the cost of which I include in the total of \$500,000.

It remains now only for me to state finally that I estimate the cost of all the improvements I suggest in plan No. 3, as indicated in red on that plan, will not exceed the sum of \$500,000, including the Bridges, Gates, and Masonry of the Locks.

If the Commissioners desire to complete the Embankment No. 1 up to the wing, but without including it, as marked in light red colour, I estimate the

further cost will be \$490,000; but if the Commissioners place the Graving Dock on the place indicated for it, \$300,000 more would include the cost of that Dock also, say a total of \$790,000. Thus supposing \$500,000 available for the Graving Dock alone, a further expenditure of \$290,000 would include the important improvement of completing Embankment No. 1 up to the wing, and to meet which further expenditure the Commissioners would be in possession of 86 building lots worth, at a very moderate estimate, \$4000 each, and there would be ample space for all the workshops, buildings, &c., required in connection with the Graving Dock.

Moreover, the Harbour Commissioners would have deep water wharf frontages of 1650 feet long, with the waiting Dock No. 1 dredged in all its area, and the outside of Embankment No. 1 in the channel of the St. Charles will be dredged 90 feet wide, to a depth of 10 feet at low water, giving 23 to 28 feet of water at high spring tides, with a landing wharf space of 3500 feet, on which the rails of the North Shore Railway Company can be carried.

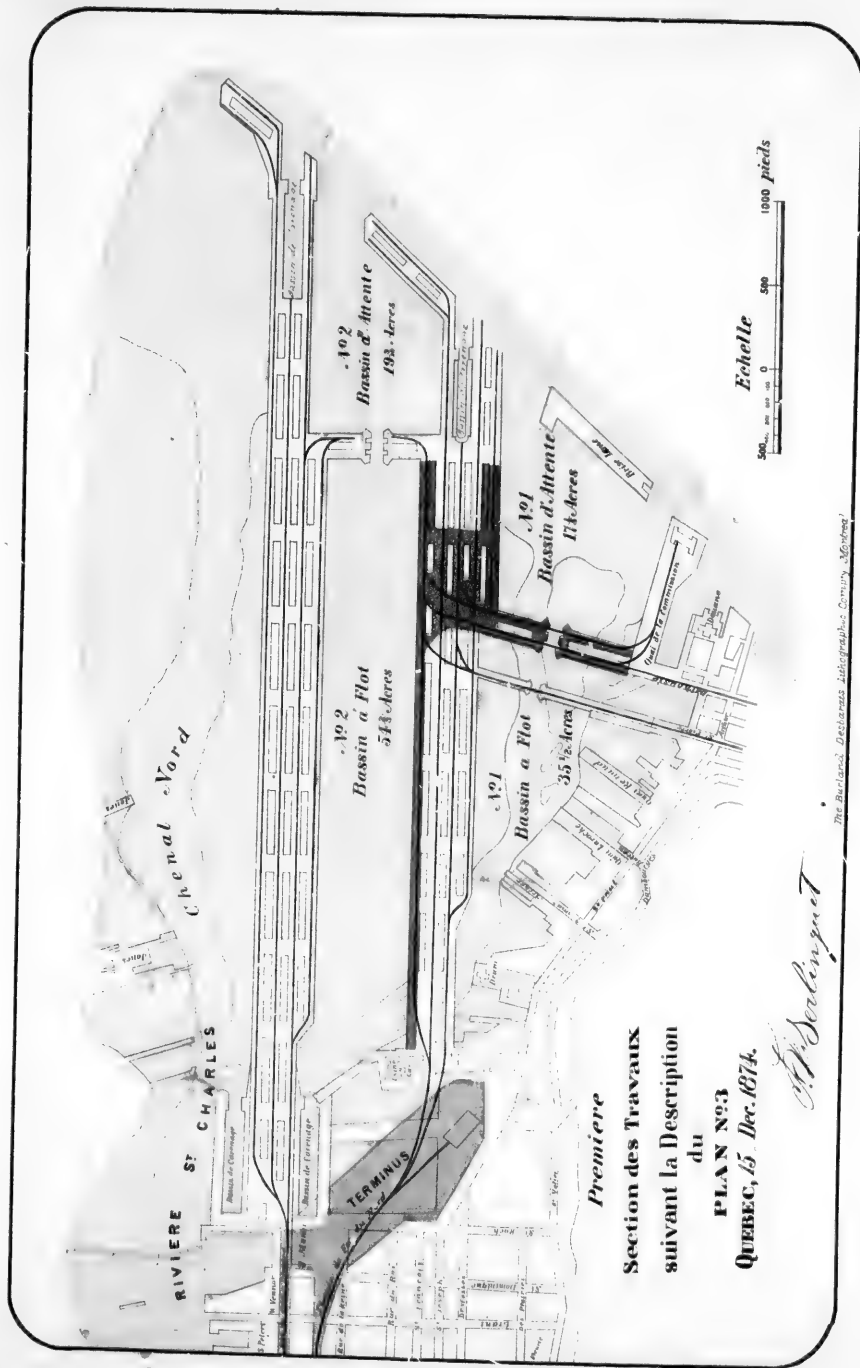
To complete the last part of the Embankment, which is colored yellow, would cost \$380,000; but it will give the Commissioners besides the wharves, 102 building lots, representing fully by their value the cost of the works.

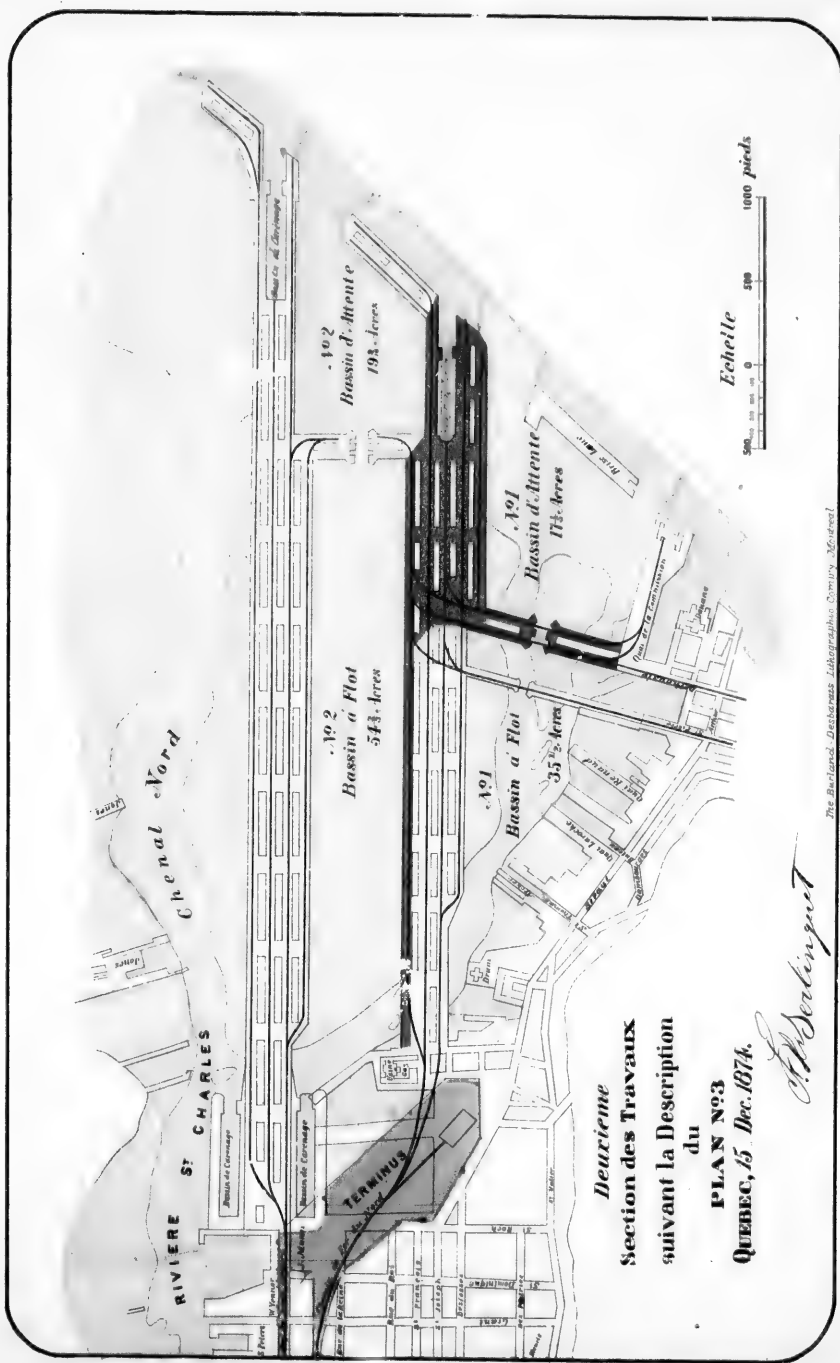
By the completion of the Plan No. 3 the Commissioners would have a closed Wet Dock of $35\frac{1}{2}$ acres in extent, of which $20\frac{1}{2}$ acres will have a depth of water of not less than 23 feet, a Waiting Dock of $17\frac{1}{2}$ acres, dredged throughout to a depth of 10 feet at low tide, a graving with every requirement of space and convenience, and the North Shore Railroad brought in communication with the present Commissioners wharves and the Lower Town.

I remain, Gentlemen,

Your obedient servant,

F. X. BERLINGUET.





Deuxieme
Section des Travaux
 suivant la Description
 du
PLAN N°3
QUEBEC, 15 Dec. 1874.

J. P. Serlingnot

